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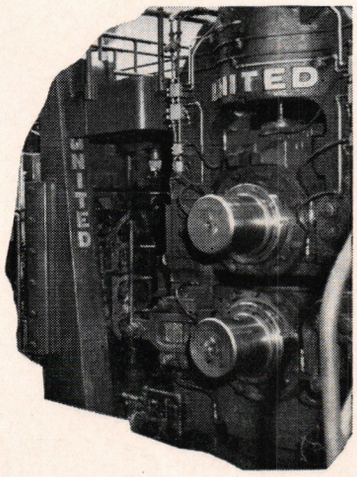
VOL. 10 MAY 1951 NO. 6

THE SCHOOL OF ENGINEERING
GEORGE WASHINGTON UNIVERSITY

Another page for **YOUR BEARING NOTEBOOK**

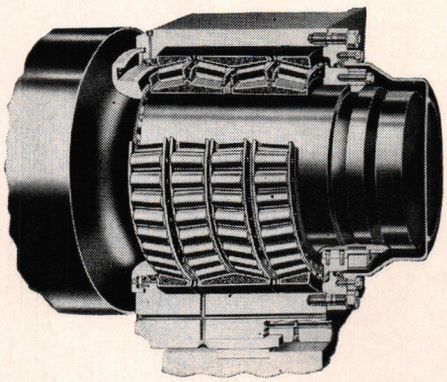


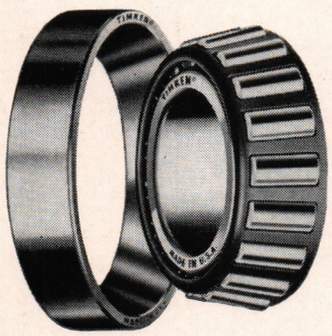
How to keep a roll neck from becoming a bottleneck

Bearings in a billet mill have to be rugged to carry the tremendous separating forces in the rolling of steel. To insure continuous production and long, trouble-free performance, engineers specify Timken® roll neck bearings. That's because Timken balanced proportion roll neck bearings permit higher rolling speeds, minimize roll neck wear, and have maximum capacity.

TIMKEN® bearings keep costs low

Tonnage records indicate that Timken bearings help keep cost per ton of steel rolled to a minimum. In many mills Timken roll neck bearings are still going strong after more than two decades of service. Because of balanced proportion design, they give greater mill rigidity, permit larger diameter roll necks than ever before. Roll neck strength is increased 50 to 60%. Load ratings are increased up to 40%.





TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

Learn more about bearings

Some of the engineering problems you'll face after graduation will involve bearing problems. If you'd like to learn more about this phase of engineering, we'll be glad to help. For additional information about Timken bearings and how engineers use them, write today to The Timken Roller Bearing Company, Canton 6, Ohio. And don't forget to clip this page for future reference.

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⓞ AND THRUST →ⓞ← LOADS OR ANY COMBINATION ✳

Oh say can you see–

"That's Jonesey—putting out his flag again.

"He hasn't missed one Sunday in the eight years we've been neighbors. I used to kid him about it a lot. Asked him why didn't he buy a cannon to shoot off with it. He took it good-natured-like. But we got to talking last week about war in general. That was the first time I even knew he had a son.

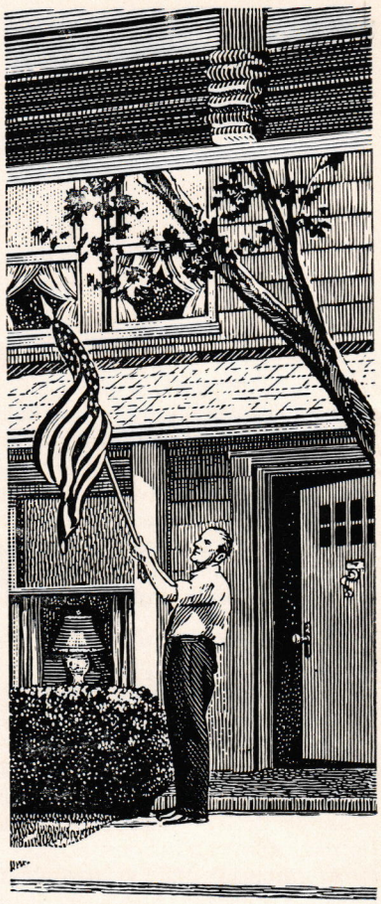
"His boy, Joe, enlisted right after Pearl Harbor and got overseas fast. When young Joe came back, Jonesey met him at the railroad station, stayed up with him all night and rode out with him to the cemetery on the hill. After it was all over, the sergeant gave Jonesey the flag that had covered Joe. *That's it over there.* I don't kid Jonesey any more.

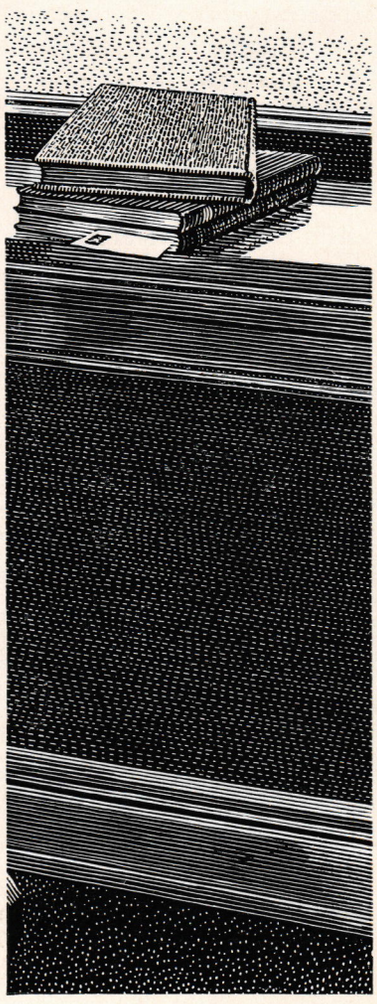
"Instead, I've been listening respectfully when he talks about the flag . . . only when *he* says it, it's Flag. With a capital F. Same capital F he puts on Freedom, which is what he really means. Jonesey sure made me think about Freedom a lot. For instance . . .

"When I vote, nobody knows where I put my X's. Nobody puts me in jail for picking out my own church. And no teachers tell my kids to spy on me and turn me in because I squawk about taxes or high prices. And when I told my boss I was quitting to open a little grocery with the dough I'd saved in war bonds, he wished me luck and said he'd have his missus buy their groceries from me.

"*That's* what Jonesey meant when he said our Freedom is right under our noses. Can't feel it or see it. But it's there just the same, wrapped up in every star and stripe in that Flag across the street.

"And, if you'll excuse me, I'm going outside and hoist *my own* Flag, too . . . just bought it last night. 'Oh say can you see?' *I sure can . . . now!*"





REPUBLIC STEEL

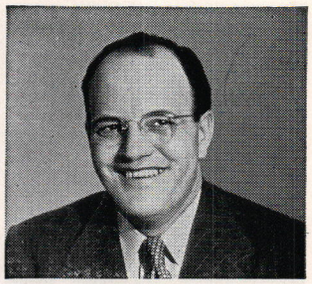
Republic Building, Cleveland 1, Ohio

Republic BECAME strong in a strong and free America. Republic can REMAIN strong only in an America that remains strong and free . . . an America who owes much of her prosperity to her many huge industries that provide her people with the world's finest living. *Through these many industries, Republic serves all America.* A typical example can be found in the Petroleum Industry whose products furnish much of the nation's power, heat and light. In this production, too, steel plays a vital role . . . carbon, alloy and stainless . . . much of which comes from the many mills of Republic.

* * *

For a full color reprint of this advertisement, write Republic Steel, Cleveland 1, Ohio

The Most Important Job in the World



O. V. TALLY

by O. V. TALLY, *Manager, Midwest Region,*
General Machinery Division, ALLIS-CHALMERS MANUFACTURING COMPANY
(Graduate Training Course, 1927)

YOUR FIRST JOB is the most important job in the world. Picking that first job carefully can mean the difference between a running start in a really satisfying life work and merely working for a living. You must have been giving this problem a lot of thought as you look toward the end of your scholastic career. I had exactly the same problem while I was working for my E. E. at North Carolina State in 1925.

I happen to think that the man who applies his company's product in the field is the most important man in the American business system. Not only does he help create the demand that keeps our factories working, he is also the force behind many of the great improvements in products and processes which have been made. He must know and understand the customer's problems and the factory's facilities, then bring the two together to produce better goods at lower cost.

I knew I wanted this kind of work. Most of all, I wanted to be free to try several fields of work; to find out where my talents lay; to see where my individual effort would bring the greatest satisfaction.

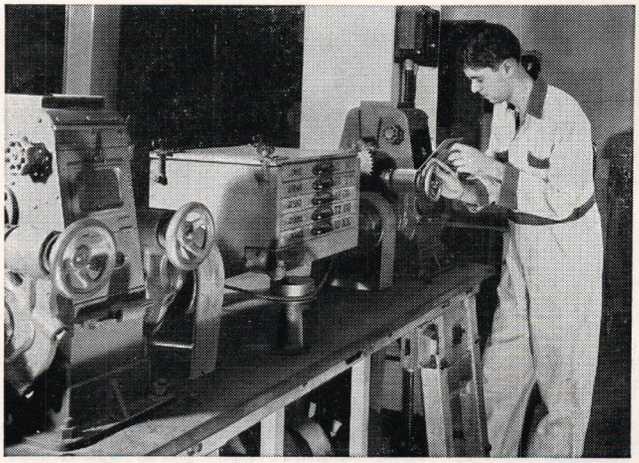
Allis-Chalmers Serves All Industry

I chose the Allis-Chalmers Graduate Training Course because Allis-Chalmers has a hand in solving the problems of every basic industry . . . food, steel, mining, aluminum, electric utilities, public works, chemicals, and many others. Here I saw my chance to find out which I wanted to work in.

Taking the course in many different departments, I learned as much as I could about as many products and industries as I could. Then I began application engineering in the New York District Office. Since then, I have been in Washington, Philadelphia, St. Louis and Chicago. As it turned out, I didn't specialize in any industry, but worked on applications for all kinds of goods to many industries. And I found the work that has made me happy.

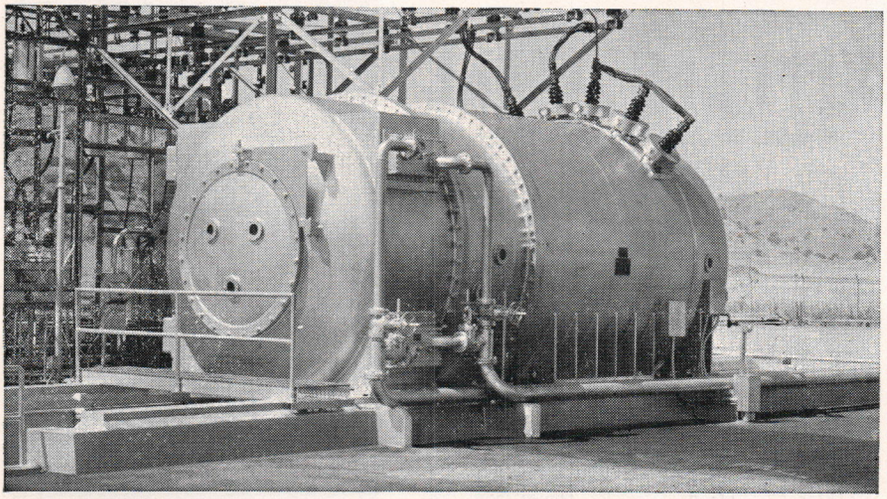
Find Your Spot

Of course, not everyone wants to be a field application engineer. The Allis-Chalmers Graduate Training Course offers you an opportunity to find out which branch of industry you will be happiest in and which job in that industry you can do best. You choose your own courses and may alter them whenever you like. You choose among electric power generation, distribution and utilization equipment; motors, pumps, blowers; basic industry equipment for processing cement and rock products, ores, wood, chemicals, food; and many other types of equipment. You can get actual practice in design, manufacturing, sales, research, administration, service and erection before choosing which one to follow. And many Allis-Chalmers customers have openings for training course graduates.



In Basic Industries laboratory scaled-down equipment is used to investigate processes and make pilot runs. Lab includes complete food, ore, wood, rock products pilot plants.

As I've said, I believe the most important job in the world to you is your job after graduation. Choose the job that gives you the greatest opportunity for advancement through your own effort. If you want to talk to someone about the opportunities at Allis-Chalmers, visit your nearest Allis-Chalmers Sales Office. Or write Allis-Chalmers, Milwaukee 1, Wisconsin, for details.



Large Allis-Chalmers synchronous condenser corrects power factor on giant Southern California Edison Company distribution system.

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee 1, Wisconsin

The MECHELECIV

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About our Cover

What goes on inside an engine valve, after a workout by the piston, is shown by this plastic model under examination. Curving lines around the valve head indicate that the load is favorably distributed and that the design of the valve is excellent. Photo courtesy Westinghouse Research Laboratories.

ENGINEERING SCHOOL CALENDAR

May 1951

May 2—Wednesday — Engineering Societies meet — Hall of Government.

May 3—Thursday—Engineers' Council meets, Conference Room, 8:15 p.m. New Council elects officers for 1951-52.

May 5—Saturday—Engineers' Banquet and Award Night — Dodge Hotel—6:30 p.m.

May 9—Wednesday—Sigma Tau meets—8:15 p.m. in C-200.

May 14—Monday—Theta Tau meets—8:15 p.m. in D-201.

May 15—Tuesday—Last day of classes.

May 27—Sunday—Baccalaureate Sermon.

May 29—Tuesday—President's Reception for Graduating Seniors.

May 30—Wednesday—Commencement Exercises—8:00 p.m. on Lisner Terrace. In case of rain Constitution Hall will be used.

. . . . and farewell

In about three weeks, a group of engineers will put George Washington University behind them forever. They will have suffered through finals for the last time, and will, in all, have completed twenty-four more semester hours' work than their fellow-students in other schools. After that last (and probably first) handshake with President Marvin, almost all of them will further pursue their destinies in the service of the U. S. Government, with the Armed Forces, or in private business.

To these men, we now take our last opportunity to say hail . . . congratulations for a job well done.

But what about the future?

Much has already been said concerning the outlook of engineers in the present uncertain world situation, urging them to continue planning for a long life of service in their chosen profession. An assignment in the Armed Forces is to be regarded as a temporary diversion of our struggle for a better world into different channels. Later, when world security has been insured, we will again pursue these aims as originally intended.

In a more idealistic, though less consequential vein, we would urge that the seniors who are completing their association with this university preserve the memory of this association to the best of their ability. Unfortunately, this long association has not, for the most part, caused a spontaneous reluctance at its termination. It is a well-known fact that George Washington students are of a far more practical nature than the average American college student. But why should such practical-minded students reject one of the few free returns from their attendance here by refusing to regard the experience here as a happy one?

George Washington University has, in spite of its urban nature, many things about it which one might well remember in later years. The Student Union, with its spontaneous roundtable discussions over the coffee cups; the Activities Office, with its carefree atmosphere; G Street on Election Day, when the sidewalk was literally paved with instructions on how to vote; a leisurely hour with nothing to do but relax out on the campus and admire the local talent, wishing that the next class would never start.

Many of the social functions which came all too seldom for engineers will afford pleasant recollections. First of all, there were the mixers, where we met the new students who would be taking over in a couple of years, and where we got to know the "profs" as real people. In midwinter, we had the Engineers' Ball which was a real success this year. The Banquet with its fine food, speeches, and little-rehearsed skits is actually more vividly remembered by the Seniors, since they regard it as their last affair with the engineers. Just after finals, there are three Senior functions which follow in quick succession: the Baccalaureate Service at the Washington Cathedral, the President's Reception for Seniors, and the Commencement program. These last three are impressive in nature, and are intended for us to remember for years to come.

These are the things that we should remember when, later on, we are reminded of the days when we were in college. Between the happy social functions, every engineer of course struggled with his studies. It was rough, sometimes, and an all-night session was not uncommon, but when it is all over, in contemplation we have a tendency to minimize the difficulties and remember the good times we had.

Topping Off the Job

by William H. Seabrooke, Jr.
Undergraduate in Civil and Industrial Engineering

In considering the design and construction of commercial building structures there is available to the engineer today a wide variety of types of roof construction. Older types, some of which are still in use, have substantial defects tending to lessen their use. As a consequence a good deal of time and study has been spent in developing newer types and new methods of applying the older types. Some of these still have obstacles to their use, and development is continuing.

The general commercial and school building structures of today can be divided for consideration into three broad types, to permit closer analysis. Let us consider them as structures resting the roof purlins on the wall, structures using steel frames, and monolithic concrete structures, containing reinforcing steel within the poured beams and columns. The first type is widely used for small stores, schools, and other one and two story structures which do not have a wide span between supporting walls. Interior steel frames and monolithic concrete are generally used on larger and taller structures.

Where monolithic concrete construction is used for the building, concrete slab roofs are usually poured in place, and the weatherproofing material placed directly on the slab. On the other two types it is possible to frame up, form, and pour concrete slabs, or to use a heavy steel mesh placed directly over the steel with concrete poured over the mesh. Because of its weight and the expense of forms, concrete is frequently an undesirable roof slab for these types of structures. A lighter material, if it can be used, would reduce the dead load and consequently would be preferable to concrete slab construction in most cases. If it is also cheaper or does not require forms, it would be even more desirable. Wood decking is sometimes used for these reasons, and provides strength, lightness and ease of handling together with

Workmen in center are pouring gypsum plaster over steel mesh and sheetrock permanent forms on warehouse roof. Steel rail subpurlins can be seen in foreground, over beams which have been fireproofed.

economy in construction. There is always an inherent fire danger in wooden construction, particularly in certain types of industrial buildings, which sometimes makes wood decking impractical.

Among the newer materials which are rapidly replacing concrete slab and wooden roof structures are gypsum plank, steel deck, poured gypsum and precast tile. Each of these types has its own specific advantages but all of them are lighter than concrete, and all of them are more resistant to fire than wood decking. Some of them require forms and some do not.

Metal edge gypsum plank is a precast structural roof deck unit, reinforced on all four edges with galvanized sheet which is formed into tongues and grooves. In addition, it is integrally reinforced with a galvanized electrically welded steel mat. The units are laid without grouting (mortar between joints) directly over the steel, with metal clips fastening the plank to each steel member. The tongues and grooves on all edges interlock with the next adjacent unit, distributing the load over a considerable area and making it possible to cantilever any given unit over the supports to engage the next unit. Joints need not be placed over the supports. Individual planks measure 2 inches by 15 inches and are 10 feet long, weighing 12 pounds per square foot. The maximum recommended span between supports is 7 feet. At this purlin spacing, the plank will safely carry a superimposed load of 75 pounds per square foot. Gypsum plank will not support combustion, and the underside is smooth, providing a satisfactory ceiling finish for mills, warehouses and similar structures. Cant strips and crickets are made of gypsum and troweled into shape over the finished plank roof.

Steel roof is prefabricated in interlocking units formed from copper bearing steel sheets galvanized or painted at the mill. Each unit is 18 inches wide, with deep ribs spaced every 4 to 6 inches, depending on the manufacturer. It is available in lengths up to about 24 feet and is usually made of 18 or 20 gauge steel, weighing from 2.5 to 3.5 pounds per square foot. Insulation and weatherproof roof covering must be provided over the steel roof deck, but the underside is satisfactory as a ceiling for commercial buildings. Maximum recommended spans on steel deck vary from 8 to 12 feet, depending on weights, with an allowable live load on 18 gauge steel deck of 50 pounds per square foot at this purlin spacing. It may be used equally well on flat, pitched, or warped roofs, and erection is very fast with low labor costs. In erection the individual plates (previously cut to size so that end joints occur over purlins) are laid in place, clipped or welded to the purlin, and overlapped at ends. Overlaps of not less than two inches are made at each intersection of plates, and all intersections are welded. Sheet metal cant strips, ridge and valley plates, curbs, etc., are welded in place over the steel deck when required. This additional application is expensive and should be avoided where possible.

Reinforced gypsum concrete slabs are poured in the field, using permanent forms. Steel sub-purlins are welded in place over the main purlins, or bar joists, and formboard laid in the intervening space, supported by the sub-purlins. Mesh reinforcing is placed over the formboard, and gypsum concrete poured in place and screeded to the desired thickness. The formboard provides a form during construction and acts as a finish for the underside after the slab has set up. Sheetrock, asbestos formboard, fiber insulation board or fiberglass insulation board may be used as formboard. In addition, a formboard is available which provides a ceiling finish with acoustical value. The gypsum concrete slab will not burn. It will not transmit excessive heat until the gypsum has been completely calcined under fire, and this is an extremely slow process. Under laboratory tests a 2½ inch thick slab, using sheetrock, spanning continuously over sub-purlins spaced 32⅝ inches on centers, has been found to carry an ultimate uniformly distributed load of 500 pounds per square foot. The exact roof deck strength would be determined by the steel section selected for sub-purlins. These sub-purlins, welded to the roof members, add bracing strength to the frame. Together with the slab which has continuous mat reinforcing they add considerably to the final rigidity.

This poured type construction can be applied to flat, pitched, or curved type roofs, with the installation cost varying with the degree of pitch. A weatherproofing must be applied over the slab after cants, crickets, fills, and so on, have been made of gypsum plaster. In buildings without suspended ceilings, the smooth surface of the permanent forms presents a finished panel undersurface requiring no further decoration. For special undersurface effects, several types of formboard are available that give the appearance of various kinds of tile. Poured gypsum slabs are satisfactory for use on buildings maintaining normal to moderately high temperatures, but special consideration must be given to those structures intended to house foundries, furnace rooms, or textile mills, because of high temperatures or high humidity. The slab sets up quickly after pouring, and an experienced crew can often pour as much as 10,000 square feet of roof per day. Cold weather does not prevent pouring, as the chemical action of the gypsum in setting generates sufficient heat to prevent freezing. After setting, it is relatively unaffected by subsequent cold weather.

Because of recent limitations by Federal agencies on the amount of steel available for building construction, there is at present a demand for gypsum slabs using a minimum of steel. These slabs can be poured without the use of steel subpurlins in particular cases. Where precast concrete beams are

(Continued on page 20)

Optical Stress Analysis

by H. B. Crummett

Undergraduate in Civil Engineering

Work is being completed on a polariscope for the George Washington University. Soon models will be prepared and demonstrations will be made.

A polariscope enables a designing engineer to see induced stresses which he cannot readily compute, that is, when loads are applied to a model in a polariscope stress patterns appear on a screen indicating both location and intensity of stress. The interpretation of these stress patterns is known as the science of photoelasticity.

A simple polariscope might consist of a light source (an incandescent lamp such as those used in a home movie projector will serve), three lenses, two polarizers (the lenses in sun glasses are frequently made of polaroid plates), a loading frame, and a screen. See Figure 1 for a schematic diagram.

The polariscope at the George Washington University measures approximately six feet from light source to screen. Both white light from an incandescent bulb and monochromatic (in this case green)

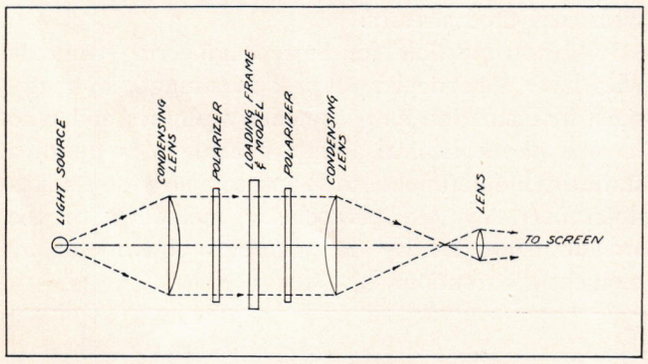
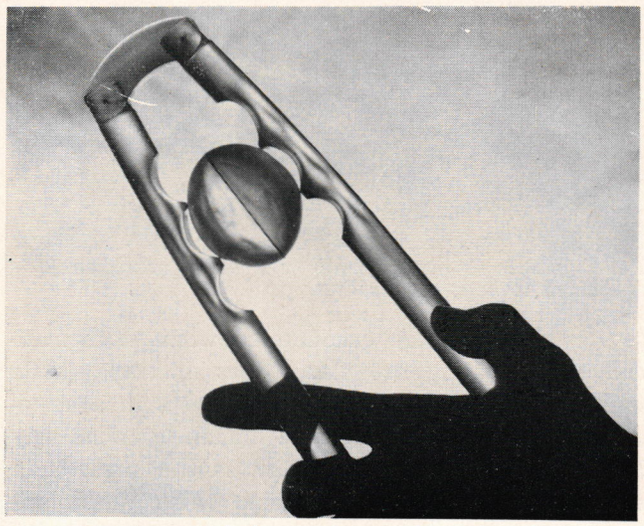


Fig. 1: Schematic Diagram of Polariscope

light from a mercury arc bulb will be used. The two condensing lenses and polarizers are eight inches in diameter permitting the use of larger models than many factory made polariscopes which have four-inch lenses. This polariscope was designed by Carl H. Walther, Assistant Dean of the School of Engineering, who has also built the polariscope and solved the mechanical and optical problems involved.

Stress may be defined as force per unit area. Mathematical formulas have been devised for computing stress and these are used to determine economical dimensions for structural members and machine parts. However, structural members and machine parts designed by the simple formulas have failed and subsequent investigations have not always indicated poor workmanship or faulty material. It is true that if a 40-pound force is exerted in tension on a solid steel



Plastic model shows stresses in nutcracker.

bar having a cross sectional area of four square inches the stress, or force per unit area (40 pounds divided by 4 square inches), will equal 10 pounds per square inch. But suppose that a hole is cut in the same bar so that its cross sectional area at one place along its length is only two square inches. The computed stress of 20 pounds per square inch at this location will represent average stress while a maximum stress of 40 pounds per square inch may be present at the edge of the hole. If the bar had a notch, groove, crack or abrupt change in shape stresses far in excess of those computed by force divided by area would occur. The polariscope is a very convenient device for determining the value and location of such stresses.

There are exact mathematical methods of stress analysis which could accurately predict the intensity of stress at the edge of the hole in the bar. However,

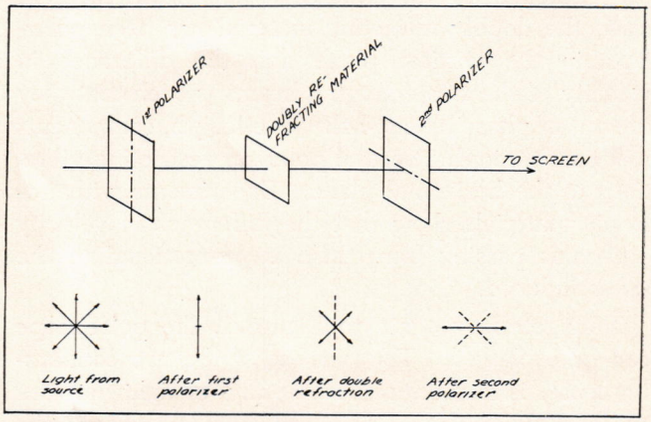
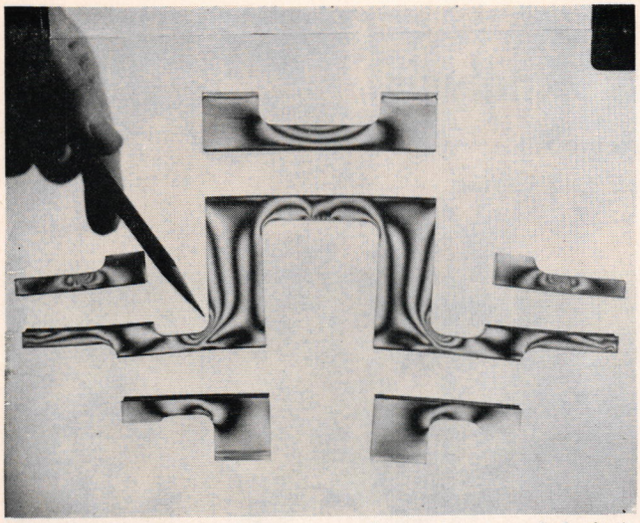


Fig. 2: Diagram showing action of components on light rays.



Pencil points to inner corner where the cranskshaft is subjected to heaviest stresses.

severe difficulties are encountered when mathematically investigating irregular shapes or loads, while with the aid of the polariscope stresses in a structural member as irregular as a human leg bone may be computed almost as readily as the stress in a rectangular bar in simple tension. Also, the polariscope has been used to verify the mathematical theories of the exact methods of stress analysis.

Although the electromagnetic theory of light is broader in scope and more often used, the simpler transverse ether wave theory of light is adequate to explain the optics of the simple polariscope. A transverse wave is one in which vibrations are perpendicular to the direction of propagation. The effect of a polarizer is to restrict vibrations to a single plane (see Figure 2). Thus light passing through a polarizer restricting vibrations to the vertical plane will not pass through a second polarizer which restricts vibrations to the horizontal plane. Models are made from transparent isotropic materials (materials whose properties are the same in all directions). These materials (e.g. glass, bakelite, and celluloid) are doubly refracting when stressed. That is, an incident beam is split into two component beams each having a different velocity and each polarized in a plane perpendicular to the other. If the beam incident upon the doubly refracting material has been polarized in the vertical plane and the difference in velocity of the two emerging beams is such that they are out of phase by one-half wave length, components will pass through a second polarizer restricting vibrations to the horizontal plane. Experiments with isotropic materials show that the difference in velocity of beams passing from them is proportional to the stress induced.

Now referring again to Figure 1, the polariscope can be explained. The purpose of the two condensing lenses is to produce parallel rays of light between the two polarizers. The third lens is to focus the image on the screen. Assume monochromatic light from the source. Light is polarized by the first polarizer. If the model is not stressed, the light will pass through it without being doubly refracted and will not pass the second polarizer. The screen will be dark. Now, load the model. At those places in the model where the stress is zero a corresponding black mark or line will appear on the screen. Black lines will also appear when the stress in the model is such that the beams emergent from the model are out of phase by whole wave lengths. These black lines are known as interference fringes and the appearance of each represents a stress increment whose value is determined experimentally. This value depends upon the material used and the thickness of the material. Where the interference fringes are closest together stresses are greatest. The screen will be illuminated at places corresponding to the places in the model where the stress is such that the two emerging beams are out of phase by half wave lengths.

Figure 3a shows a model beam loaded so that its center is in pure bending. Figure 3b shows the stress pattern for the section in pure bending that might appear on a polariscope screen. In this case the extreme fiber stress was determined mathematically and found to be 1820 pounds per square inch. Three and a half interference fringes appear between the neutral axis and extreme fiber; therefore, the stress increment represented by each fringe is 1820 divided by 3½, or 520 pounds per square inch. This is in agreement with computed stresses.

It is now possible for those engineering students who have a particular interest in strength of materials, mathematics, and elementary physics and who have some mechanical ability, to make a model of a statically indeterminate truss and compare the stresses determined by the photoelastic method with the stresses computed by the theorems of work or by moment distribution.

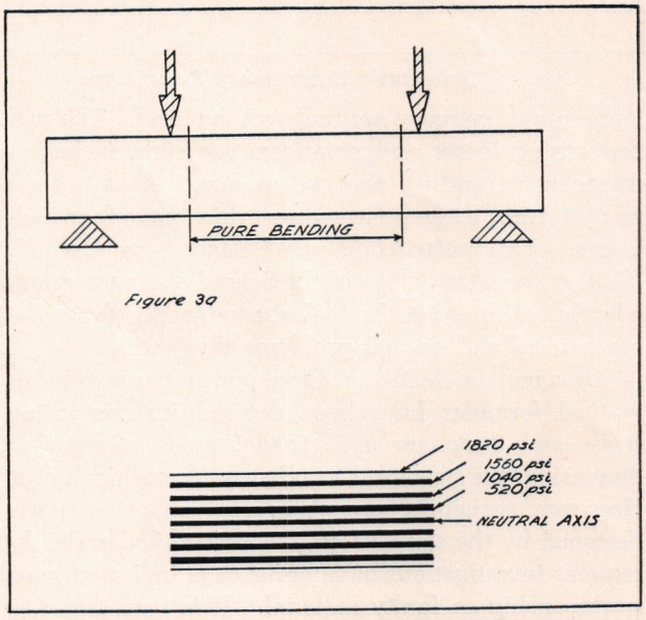
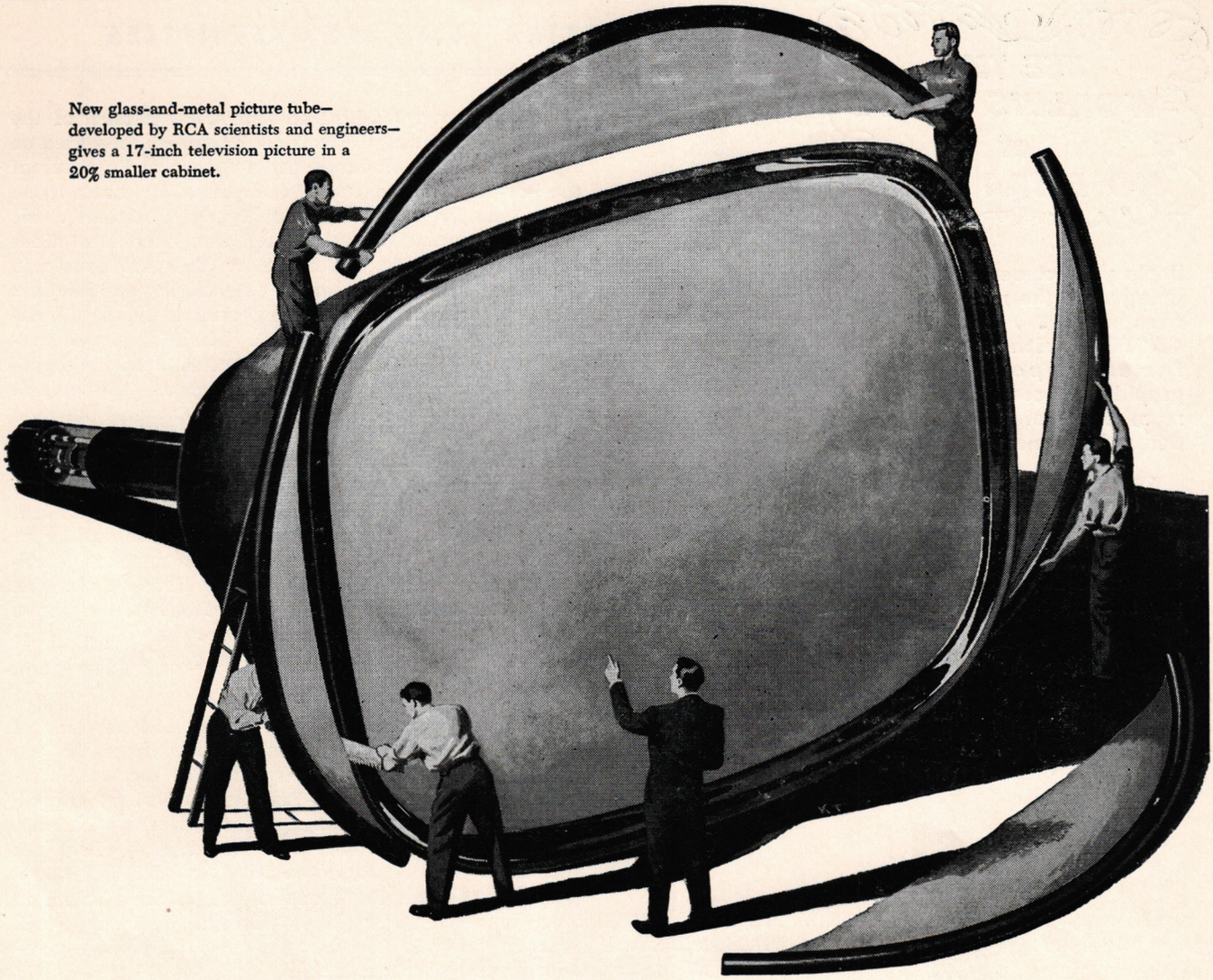


Fig. 3: Schematic representation of stress lines appearing in typical test model.



New glass-and-metal picture tube—developed by RCA scientists and engineers—gives a 17-inch television picture in a 20% smaller cabinet.

Now—television "squares away" with a **Bigger Picture**—*smaller tube!*

Ideal for mass production, compact, and lower in cost, RCA's glass-and-metal picture tube was a major advance in television history.

Now comes still another important RCA engineering advance, *rectangular* glass-and-metal kinescopes. Engineered for the big 17-inch pictures you want in a receiver that takes up *less* cabinet space—as much as 20% less—the new kinescope gives you finer pictures than ever before . . . in sharp and brilliant focus over every inch of your screen. And, as yet another step ahead, RCA's new picture tube offers an improved type of Filterglass faceplate—frosted Filterglass—developed on principles first investigated by scientists of RCA Laboratories, to cut reflection, and give you sharper picture contrast.

* * *

See the latest advances in radio, television, and electronics at RCA Exhibition Hall, 36 West 49th Street, N. Y. Admission is free. Radio Corporation of America, RCA Building, Radio City, New York 20.

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SOCIETIES AND FRATERNITIES

● The George Washington University Branch of the American Institute of Electrical Engineers presented on April 4th Mr. W. J. Lank, Chief Electrical Engineer of the Potomac Electric Power Company. Mr. Lank spoke on the subject of "Residential Type Substations". He pointed out that in Washington unsightly substations cannot be tolerated, and therefore, they are housed in structures that blend with the neighboring architecture. Mr. Lank illustrated his talk with slides showing various types of residential substations and their associated equipment. He also showed pictures that were taken following the explosion that occurred at the Bethesda Substation during a lightning storm last November. The branch was honored at this meeting by the presence of Mr. Frank Crider, Chairman of the Washington Section of AIEE.

Since the time has come when some of us, like the old soldier, must fade away, the election of branch officers for the coming year will be the principal item on the agenda for our next regular meeting in May. Jim Hampton and Sam Collins have been appointed members of the committee to nominate candidates for the offices of chairman, vice-chairman, secretary, treasurer, and one representative to the Engineers' Council. Anyone interested in becoming a branch officer should contact one of the above named men prior to the May meeting. To be eligible for election, a candidate must be an active member of the branch, and in good standing.

● The major business of the March 14th meeting of Sigma Tau was the election of the new officers for the coming year. Bob Niederstrasser was elected President; Bob Smith, Vice-President; Herbert Rosen, Treasurer; Paul Michelsen, Secretary; Norbert Rendler, Corresponding Secretary; Joel Sonnabend, Historian; and Fred Battle, Representative to the Engineers' Council. Herman Norwood, elected to the Council in February, will continue to serve until next February. Professor B. C. Cruickshanks will again be Chapter Adviser. The new officers were installed at the following meeting on March 28th.

At a special ceremony held on April 18th, Professor William T. Dickinson and Professor Charles E. Greeley were initiated as Faculty Members. The student members of the spring pledge class were initiated into the fraternity on the afternoon of Saturday, April 21st. The banquet, held on the night of the same date, was given in their honor at the Lee Sheraton Hotel. The dance that followed the banquet enabled the initiates to associate with the old members. This is the first time dates have been invited to the Initiation Banquet, which this year was followed by a dance.

● The regular meeting of the Institute of Radio Engineers held on April 4th was highlighted by the showing of two technical films, "Radio Transmitter Principles and Typical Circuits", and the "Effect of Ionosphere on Radio Wave Propagation". The door prize, a radiotron designer's handbook, was won by Carl Tonty.

This year saw the beginning of an effort to increase participation by the underclassmen in IRE activities. The meeting programs have been augmented with movies, door-prizes, refreshments, and general discussion. The success of this effort can be seen when it is realized that even though a large number of members are graduating this June, this year's group of juniors and sophomores are able and willing to carry the student branch of the IRE to even greater heights than those attained by President Fred Battle and his able staff of officers. Elections will be held on the last meeting of the school year on May 2nd.

A further incentive for active participation is being planned by the Washington Chapter of the IRE. It has been proposed that a student award be given every year to an outstanding member of the student branch at GWU. The award will be signed by the National President and will be presented with one year's membership in the senior chapter.

● Since the March initiation of pledges, Gamma Beta Chapter of Theta Tau has been kept quite busy, with two parties having been held for new rushees, elections of officers for the coming year, and plans for a third party.

The first party, a stag affair, was held at the Chevy Chase Inn, and the second was held at the Veteran's Club, on Twenty-second Street. At both functions a number of prospective members were in attendance, as well as the members of the active chapter.

Elections of officers for the coming year were held by the alumni of Theta Tau, Chuck Meyers being elected President and Harold Thomasson Secretary. The active chapter has also held its elections, and Dick Caldwell was elected Regent for the coming school year; Ed Davitt is the new Vice Regent; Dick Julius is Scribe; Herman Norwood Treasurer, and John Held Corresponding Secretary, with Al Moe elected to the Engineers' Council.

Plans are now being made for the big final party of this school year, but exact details are not yet available, since the chapter has not selected the location as yet. A new pledge class will be announced shortly, and the men pledged in this group will be initiated shortly after the beginning of the new school year. On the sports front the chapter is still going strong, with the bowling team going all out on practice in an effort to win the intramural bowling championship for the second straight semester.

AMERICAN SOCIETY OF CIVIL ENGINEERS FOUNDED 1852

● The last meeting of the ASCE was held on April 4th in Gov. 201. Plans for the next meeting on May 2nd include elections of the new officers and the presentation of technical papers by students. A $10 initiation fee for junior membership in the ASCE will be presented to the winning graduate and a handbook to the winning undergraduate.

Joe Barrasso, Chairman of the Prize and Award Committee, listed the several awards available to CE's. These were the following: the Lincoln Arc Welding Foundation National Award on arc welding design and fabrication, the award of the National ASCE to the winning paper on "Why Is a Code of Professional Ethics Desirable", the Automotive Engineers' Award on topics of automobiles and airplanes, and the cash award by the Local Chapter of ASCE presented with a two-year membership.

President Bernie Crummett presented the details of the ASCE Annual Conference, which was held at Maryland University. Then, Mr. A. T. Goldbeck, the guest speaker for the evening, was introduced to the group. Mr. Goldbeck, who has done engineering research for some 45 years, is presently the Engineering Director of the Crushed Stone Association and on the committee of ASTM. His topic for the evening was "Engineering Research".

● The American Society of Mechanical Engineers held its spring elections at the April 4th meeting. Newly elected as officers are the following: Robert Anderson, Chairman; Robert Smith, Vice-President; Daniel McCarthy, Secretary; Richard Sorrell, Treasurer; Albert Parks, Engineers' Council Representative, and John Kaye, Honorary Chairman. After dispensing with minor business, two films were shown. The first, "Wings to Bermuda", was an excursion film to the Atlantic island. The second film was the Evening Star's "The Star Goes to Press", covering the technical aspects of putting out a newspaper. Make-up, setting type, and printing were some of the phases covered.

The University of Pennsylvania ASME Branch was host to the Third Regional Student Conference held on April 20th and 21st. Professors B. C. Cruickshanks, C. E. Greeley, J. Kaye and R. G. Trumbull, along with Robert Curtis and Frank Yeide, attended the conference. The major event was the presentation of papers by attending students. It is hoped that a larger student group from GW will, in the future, attend the Annual Conferences.

We would like to remind you that the May 2nd meeting is the last of this school year. It is hoped that all members will attend and make this the best attended meeting of the year. The newly elected officers, who will carry the torch for the coming year, would like to see you all there.

NEWS AND VIEWS

CAREER CONFERENCE A SUCCESS

Highlight of the George Washington University's first Career Conference, on April 11th, was a speech by Captain E. V. "Eddie" Rickenbacker, famous World War I American Ace and present president of Eastern Air Lines. Captain Rickenbacker spoke on world conditions and the all-important role of college students. Although not a college man himself, he said he felt that despite the present emergency all students must have patience and, above all, hope; for in the hands of the educated rests the future of America.

After the main speech in Lisner Auditorium, the audience separated into various job forums. The Engineering Forum remained in Lisner Auditorium where representatives of the Federal Government, public utilities, and private industry spoke about the job opportunities in their different fields.

Mr. Robert Ramspeck, Chairman of the U. S. Civil Service Commission, represented the U. S. Government; Mr. Wilfred C. Taylor, General Employment Manager of the Chesapeake and Potomac Telephone Company, discussed public utilities; and Mr. Hector M. Airing, Executive Vice-President of Johns-Manville Corporation, spoke for private industry.

Following the talks there was a question period with representatives from Naval Ordnance, Coast and Geodetic Survey, National Bureau of Standards, the civilian personnel branch of the U. S. Army Corps of Civil Engineers, Geological Survey, and the U. S. Public Health Service, and the three speakers serving as a panel.

With the aid of roving microphones members of the audience were able to ask questions concerning specific jobs, advancement in those jobs, the procedures for obtaining positions and more general inquiries.

AIR FORCE RESERVE COMES TO G. W.

Last month the University received official word from the United States Air Force that an ROTC program for George Washington has been approved. Since the beginning of the academic year, September, 1950, the University had been applying for the establishment of a unit to be incorporated into the college curriculum. This Air Force ROTC group will operate primarily to train engineers and scientists for military service and will be similar to units in many other colleges. There will be a four-year course involving two years' basic training in military science and technical training which will count as two semester hours per semester. The second two years will be for advanced training and will have a value of three semester hours per semester. These will total twenty semester hours which may be counted toward graduation along with the required curriculum.

The program, now in its primary stages, is expected to start at the beginning of the fall session. Space and facilities will be provided to accommodate three Air Force commissioned officers and three to six non-commissioned officers who will handle the entire program. Arrangements are being made to provide hangar space at one of the airports south of Alexandria, Virginia, for storage of technical equipment and machinery.

The new ROTC program at the University is designed primarily for full-time students with engineering or science majors; however, all male students throughout the University are eligible to take the courses.

Final details concerning qualifications, classes, and time allocations have not yet been determined, but all information regarding the program will be made available to interested students as soon as it is released.

STUDENT COUNCIL ELECTIONS HELD

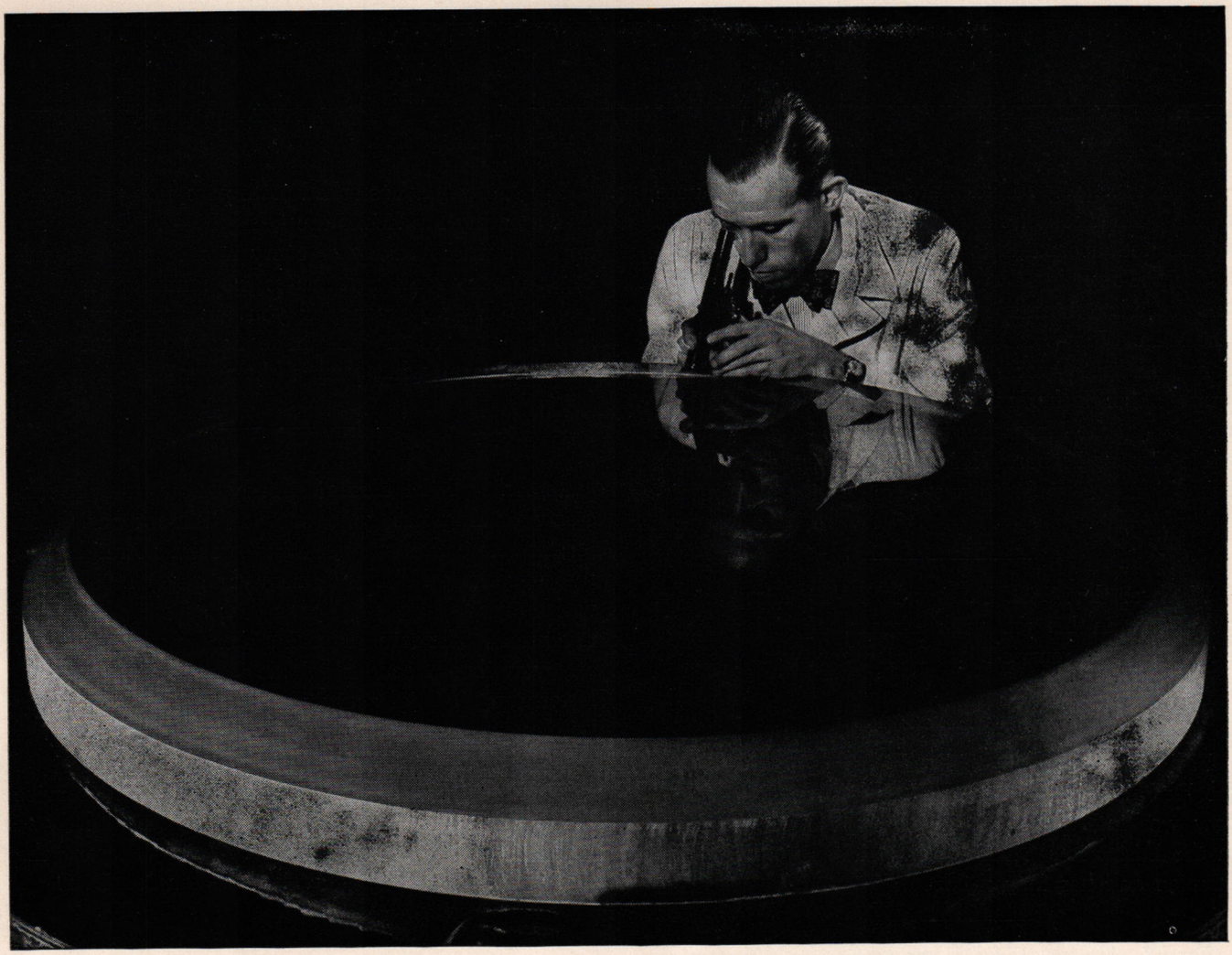
Candidates entered in the Student Council elections, and running with the support of the Engineering School, had varied success on April 12 and 13 as a fraternity coalition swept most of the offices. The two engineering candidates were Fred Battle, President of the IRE, and candidate for Vice-President, who lost by a small margin, and Bob Harwood, member of the ASME and past President of the University Sailing Club, who won in the race for Chairman of the Student Union.

Analysis of the returns shows that only one-tenth of the student body showed up to support their candidates; however, the engineers made a much better showing by turning out fifty percent of their enrollment.

Although the engineers did not run a full ticket, they cooperated with a number of independents on campus to form the Independent Reform Party in an effort to attain broad representation in the University's largest student governing body.

The bitterness of the whole campaign stemmed from an effort of a group of fraternities to elect a solid slate. Although they did not form a coalition officially, the fraternities cooperated in an effort to eliminate all competition among their own ranks for the various offices. Ever since fourteen of the fraternities were censured for holding social functions in competition with the Engineers' Ball, a direct violation of the student activities regulations, they have sought to elect their candidates, that they might dominate the Student Council for the coming year. They were successful in filling most of the offices despite the determination of the Independent Reform Party to elect its candidates.

The unusually large turnout of engineers may be attributable to the success of announcements in engineering classes and of postcards which were mailed to all engineers familiarizing them with the candidates and reminding them to vote.



One-ton window for a supersonic wind tunnel

Just exactly how does a jet plane behave when it is roaring through the air at supersonic speed?

Scientists, peering through windows of Corning optical glass such as the one you see here, will soon have a more thorough answer to this question than ever before.

This piece of optical glass, weighing more than a ton, is one of two of the largest pieces of optical glass ever made. They will be used in the six by six-foot supersonic wind tunnel of the Ames Aeronautical Laboratory of The National Advisory Committee for Aeronautics at Moffett Field, California.

This tunnel generates wind velocities up to twice the speed of sound, equivalent to 1500 miles per hour at sea level.

The windows are six inches thick and 52 inches in diameter. They are so clear and free of imperfections that photographs of shock-wave and air-flow patterns can be made through them—to furnish scientific data of great value in the design of future airplanes and missiles for supersonic flight.

Until Corning research and glass-making skill found a way to mass-produce pure optical glass in large shapes, science had no suitable substance for wind-tunnel windows. Perfect optical glass with enough area to permit a full view—and thick enough to withstand the enormous wind-tunnel forces—was unheard-of.

Today, Corning can make lens blanks, directly from the molten glass, ranging in size from tiny camera lenses to these gigantic windows.

This Corning development is not only helping to make this country independent of foreign sources of optical glass; it also promises many new tools for science, paves the way for widespread improvement in products and processes.

Throughout industry, *Corning means research in glass*—research which has continually developed new kinds of glass and new uses for existing ones. As Corning has steadily pushed back the frontiers of glass knowledge, glass has become a material of limitless uses.

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ALUMNEWS

Four recent graduates are now doing graduate work at other colleges and a fifth had started, but was interrupted, according to news received here recently. *Dick McConnell,* BCE '50, had enrolled at Yale, but was forced to interrupt his training because of illness last term. *James Robbins,* BCE '50, is also at Yale doing graduate work. *Edward Simonetti,* BCE '50, and *William Sutherland,* BCE '50, are both doing their studying at the Massachusetts Institute of Technology, while *George Pulver,* BCE '50, is at Harvard Business School doing graduate work in Business Administration.

We hear that *Dick Daniels,* BEE '50, has gotten a promotion in his job with Minneapolis Honeywell. Dick, who got married last December, was a former staff member.

Bob Lothrop, BME '41, who was formerly with the DuPont Laboratories at Waynesboro, Virginia is now working with the O. S. Peters Company here in the District as Chief of their Laboratory. Bob is married and has four children.

Fred L. Mayer, BEE '50,has written us a very nice letter which we quote "My first job was with General Electric Engineering Associates, consulting engineers, from July to December. I left there to work for the Navy Research Section during January and February. Then I had the opportunity to work for Allis-Chalmers where I am now under the company's two year Graduate Training Program.

"Without trying to sound smug, I am convinced that Allis-Chalmers offers opportunities unequaled by any other company. Under our training program we are rotated every two months from one self-chosen location in the plant to another, gaining thus valuable experience in those fields of engineering for which we express our highest interest. Not to be neglected is the wonderful attitude and personal interest that the company shows towards its fledgeling engineers. In other words, I think I hit the jackpot."

It sounds wonderful Fred, and we sincerely hope you did hit the jackpot!

Mickey Schulte, BEE '47, is working for Western Electric. Mickey has been selected as one of 50 outstanding engineers from the whole country to do research for Western Electric in their New Jersey laboratories.

Pop McKnight has asked us to pass along the word that monthly luncheons are being held at O'Donnells on the third Thursday of every month at 12:15, and a good many recent graduates are coming over regularly to the luncheons. If you are interested, give him a call (it's in the phone book) and get more information on what sounds like a very fine idea.

As some of the alumni already know, their Mecheleciv mailing has gone onto a different basis. In future (as soon as we get all the records straight and the subscription blanks in from you guys) Mecheleciv will be mailed on a calendar year subscription basis to alumni. The rate for 1951 (calendar year) is $1.00, and you should send the little form attached to the letter Pop McKnight sent you recently in immediately with your buck. Dick Caldwell is getting the lists of subscribers up to date, and prompt submission of that little slip will assure you uninterrupted service in receiving the magazine. Send the slip directly to Mecheleciv Magazine, Student Union Annex, the George Washington University, Washington D. C.

ENGINEERING PERSONALITIES

UNDERGRADUATE

One of the few engineers in school who have won varsity letters in sports, Bob Harwood has led an eventful extra - curricular life at the University. While here, he has divided his time between studying mechanical engineering and sailboat racing, with motorcycle competitions as a sideline.

Almost a native Washingtonian, Bob came here from Richmond while only a year old. District schools provided all of his secondary school education, and he graduated from McKinley Tech in 1944. It was while in high school that Harwood began his mechanical training, working twenty to thirty hours per week at night as an automobile mechanic. A Navy enlistment immediately followed graduation.

While in the service Bob served as a torpedoman and gunners' mate. The last stages of the war found him in combat in Okinawa and Japan. After this, he says his only occupational duties were chasing women in Korea and China.

Upon his discharge, Harwood still felt the influence of Navy life and found himself becoming increasingly interested in sailing. At the same time his pre-service bug for motorcycling was again making itself felt. In the spring of '47 this interest almost spelled curtains for Bob. While stunting with five other riders, his machine was struck broadside by another traveling at high speed. Harwood's back was fractured in six places and his leg in nine.

After a long confinement to a hospital bed, he was allowed to hobble outside on the grounds with only a short cast. However, his doctor found him riding a visiting friend's motorcycle, and back on went the hip-to-toe cast. In all he has owned about seven cycles, but now this sport has become secondary to sailing.

By late summer of '47 Bob was able to join the sailing team. He immediately was appointed sailing master, and two years later was elected team captain. The years '48 and '50 found him holding the office of President of the Sailing Association. During this time George Washington has always ranked high nationally in the sport and placed third in the national competition on one occasion. Bob has placed third and second respectively in the tempest class of the President's Cup Regatta in the last two years. He won

(Continued on page 19)

FACULTY

Dean Frederick M. Feiker, who will be seventy years old June 14th, will retire as Dean of the School of Engineering at George Washington University at the end of this academic year. Dean Feiker has been the Dean of the School of Engineering and professor of management problems at the University for thirteen years and although he is retiring from his position of administrator, he will continue as Professor Emeritus in Residence for the coming academic year. It has been a policy of the University to retire administrators from the University when they reach the age of sixty-five, but due to the Dean's capable management of the School of Engineering, the administration has retained Dean Feiker for five years after the normal retirement age.

A native of Northampton, Massachusetts, Dean Feiker was graduated from Worcester Polytechnic Institute with a B. S. in Electrical Engineering in 1904, and received from that Institute in 1938 the honorary degree of Doctor of Engineering. During 1906-1907 he served as technical journalist with the General Electric Company. He was then made editor of *Factory* magazine. Later he served as chairman of the editorial board of *Factory* and of *System*, as editor of *Electrical World*, and as Vice-President of the McGraw-Hill Publishing Company.

In 1921, Herbert Hoover appointed him Assistant Secretary of Commerce. From 1923 to 1926 he served as Vice-President of Electrical Development, and from 1927 to 1931 as managing Director of Associated Business Papers. He returned to the service of the Federal Government as Director of the U. S. Bureau of Foreign and Domestic Commerce from 1931 to 1933.

In 1933 Dean Feiker was chosen to direct the educational survey of the Textile Foundation. He has continued as educational consultant to this foundation to the present time. He spent a month during 1949 in England advising English manufacturers with respect to the educational program of the English textile schools.

From 1934 to 1940 he served as Executive Secretary of the American Engineering Council. He was a member of the National Inventors' Council of the Department of Commerce in 1940, and was Chairman, Divi-

(Continued on page 19)

UNDERGRADUATE

(Continued from page 17)

the West River Regatta in '49 and holds numerous other awards. Life on the water has not been without mishap, however, as boats under his masterful hands have capsized four times in mid-winter on the icy waters of the Anacostia River.

Engineering study and experience played a major role in one of Harwood's most interesting activities. He joined with three other sailors in '49 and developed a method of producing plastic sailboat hulls at a lower-than-market cost of other types. After eight months of research in conjunction with the Navy Department, the students built a prototype of the craft. Shortage of plastics and other difficulties have kept the boat out of production, but the developers are still keen on the idea.

The American Society of Mechanical Engineers has counted Bob a member for several years. Last fall his scholastic record was recognized by his selection for Sigma Tau. The members of the 1950-51 Engineers' Council elected him as their member-at-large for the past year. His latest success was in the recent Student Council elections. By virtue of this victory Bob is the new Chairman of the Student Union Board for the coming year.

FACULTY

(Continued from page 17)

sion of Engineering and Industrial Research of the National Research Council from 1945 to 1948.
trical Engineers, American Society of Mechanical Engineers, Omicron Delta Kappa, Sigma Xi, Sigma Tau, Theta Tau, and many other national professional and honorary groups.

Dean Feiker, who is an active member of the Washington Society of Engineers, was presented by that society with an award that had been presented only twice previously. The award was created for those "whose accomplishments in engineering have made an outstanding contribution to the advancement of engineering knowledge and practice and to the maintenance of a high professional standard."

Dr. and Mrs. Feiker have seven children, four sons and three daughters. Six of these were in war services, and one son gave his life in the service of his country.

The Dean has not only been very active as an administrator and a professor, but also a ready participant in many of the Engineering School's societies and social gatherings. He has always been "one of those present" at the Engineers' Mixers, the Engineers' Ball, and the Engineers' Banquet.

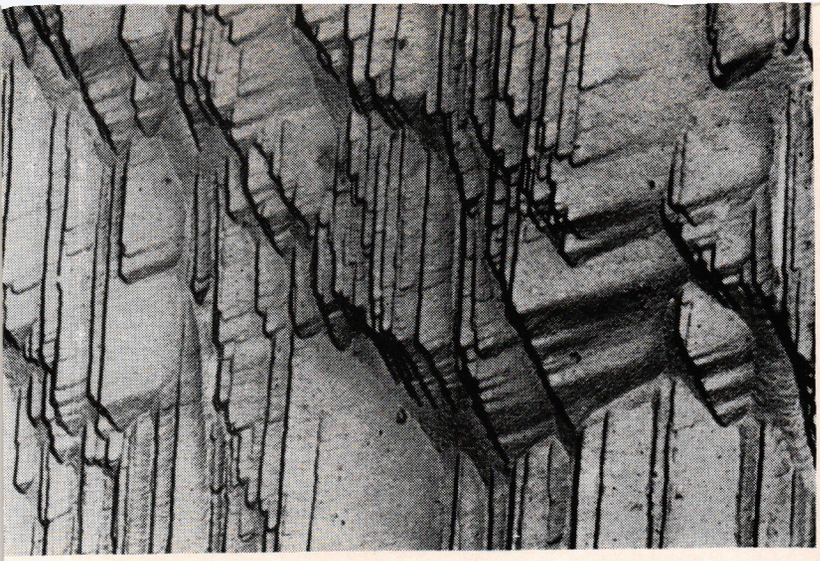
TOPPING OFF THE JOB

(Continued from page 8)

being used, the formboard is laid between and paralleling the beams with sheet metal tees at the joints between the boards. If precast bridging is used in this type construction, steel rods placed over the formboard at right angles to the precast beams, and resting on the upper edge of the beams are used to support the upper lugs of the bridging. The mesh reinforcing of the slab is tied to the reinforcing steel projecting from the upper edge of the precast beams and the slab is poured in the usual fashion. Another system not involving steel sub-purlins is used with bar joists, where the bar joist spacing is 30 inches or less. Steel lugs in a tee form are welded to the bar joists in a staggered formation spaced at 4 foot intervals along each bar joist and the formboard is laid with the board joints placed over the bar joists. A wire clip can also be used in lieu of the steel lugs, and most building codes permit the use of either of these types. The function of the lug or clip is to tie the reinforcing mesh in the slab to the bar joists. Slab weights vary with all of these different kinds of applications, but in general they will be found to range from about 10.5 to 15.0 pounds per square foot, with the sub-purlin section used being the biggest determining factor in the final weight.

There are available a wide number of types of precast tile. Because of the many variations in this field it is difficult to make specific statements which will apply generally to all of the kinds of tile. Generally, however, they are cast of lightweight concrete, gypsum concrete or a modification either with or without reinforcing mesh embedded in the tile. They are usually supported on steel tee sub-purlins welded to the main purlins. A grouting groove is usually provided along the top edge of the tile and some form of plaster is used to grout this space after installation. The tile is short, usually about 30 inches, and the high gypsum content tile will not burn nor transmit high temperatures. Weatherproofing materials may be nailed to most types of precast tile, and the final weight will be in the neighborhood of 15 to 17 pounds per square foot, exclusive of sub-purlins. They are particularly adaptable to pitched roofs, but may be used on flat or slightly curved roofs. A design load in the neighborhood of 50 pounds per square foot is general, although some of them will safely support 100 pounds per square foot. They provide adequate insulation for normal requirements, and erection is fast regardless of winter weather, since only a small amount of grouting is required. Weatherproofing should be applied as quickly as possible after installation, and the tile is not generally suitable for application on buildings where high humidity or high temperature will be encountered.

It becomes obvious from this brief summary that there is available an ample number of types of roof deck materials today to satisfy the most exacting designer. Naturally, it is impossible to include here details on all of these types. It is to be hoped, however, that this survey will stimulate the interest of young engineers so that they will investigate in detail some of these methods, thereby increasing the number of tools available to them in creating modern structures.



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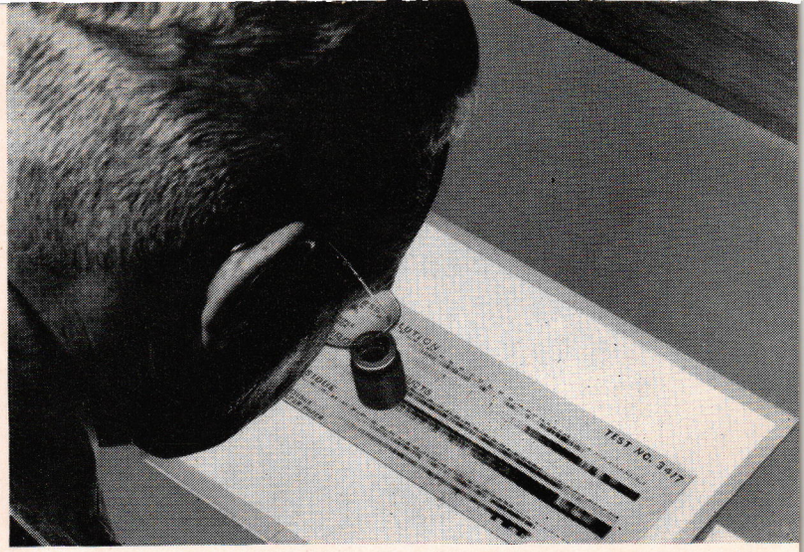
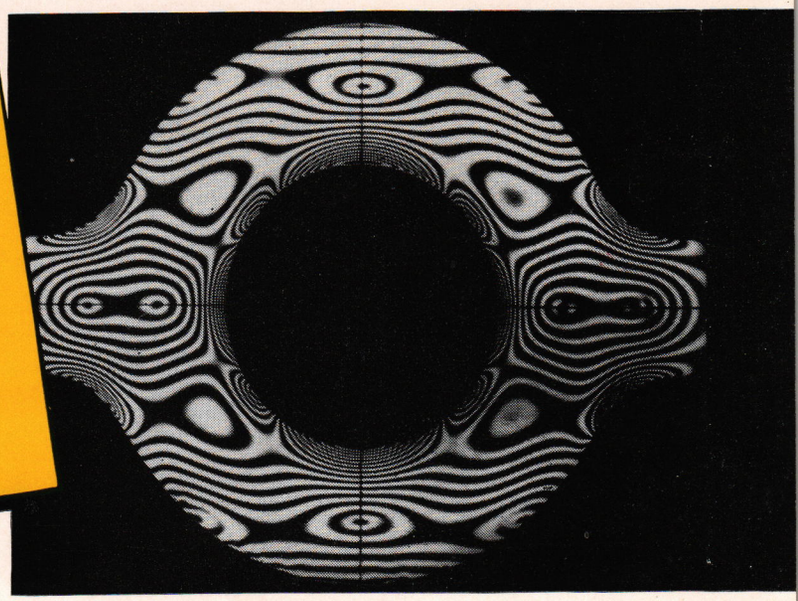


DETERMINES COMPOSITION OF MATERIALS. The composition of almost any material is shown in a flash through spectrography. It is a means of making frequent production line analyses that keep a check on specifications.

Engineering has an ally in photographic analysis



SHOWS STRESSES AND STRAINS VISUALLY. By photographing the patterns developed by polarized light as it passes through a plastic model of a part, the engineer can have visible evidence of the points of stress within the part.

In the engineering laboratory—on the production line—photography is today an important tool. It searches metal structure through electron micrography, x-ray diffraction, and micro-radiography. It makes swift mechanical motions seeable by showing them at a snail's pace with high speed movies. Or it can halt an instant of an instrument's fleeting trace and record it for study.

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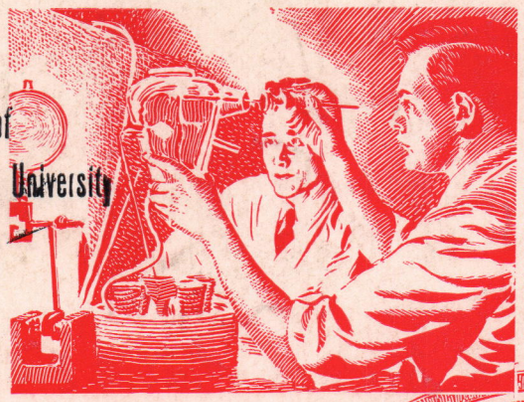
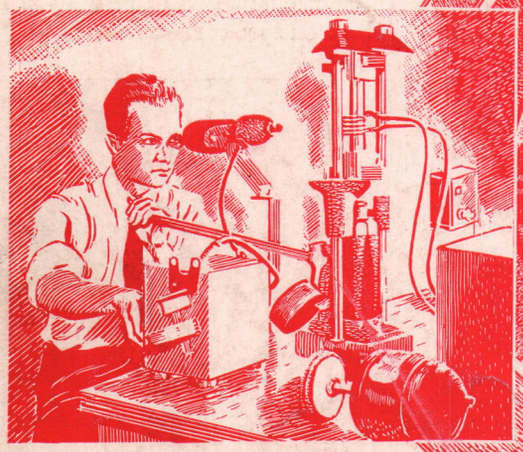
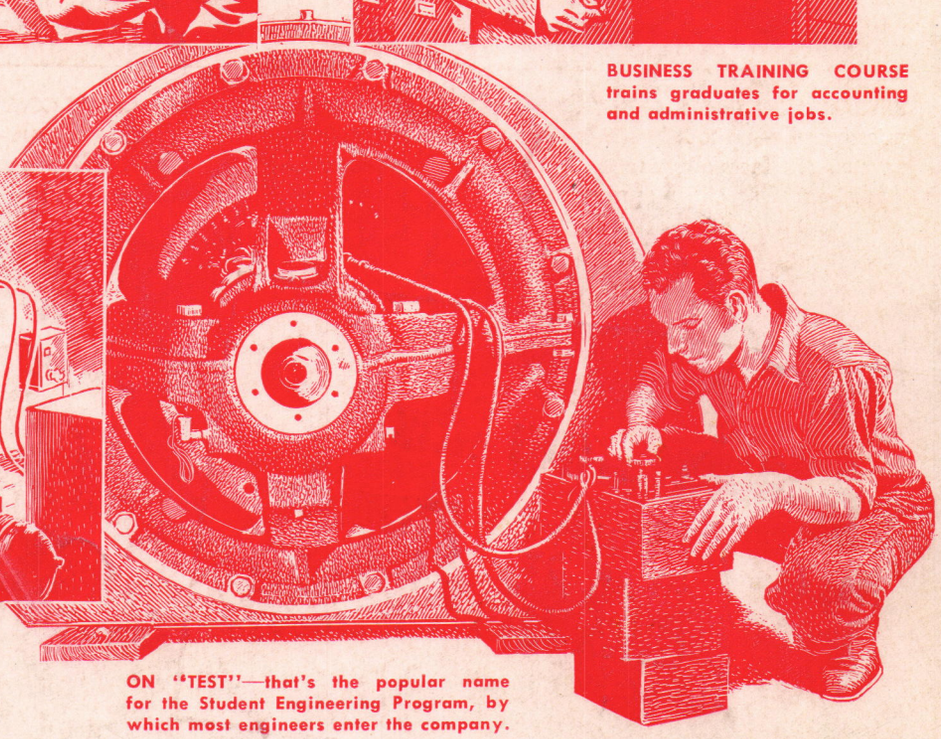


PHYSICS PROGRAM offers studies and rotating assignments for physics majors.

BUSINESS TRAINING COURSE trains graduates for accounting and administrative jobs.



CHEMICAL AND METALLURGICAL PROGRAM is for chemists, chemical and metallurgical engineers.



ON "TEST"—that's the popular name for the Student Engineering Program, by which most engineers enter the company.

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Both the individual and the company learn a lot when a college graduate enrolls in one of these four basic General Electric training programs.

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